



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 11:53 AM UTC

PDB ID : 3QS8 / pdb_00003qs8
Title : Anthranilate phosphoribosyltransferase (trpD) from Mycobacterium tuberculosis (complex with inhibitor ACS174)
Authors : Castell, A.; Short, F.L.; Lott, J.S.; TB Structural Genomics Consortium (TB-SGC)
Deposited on : 2011-02-20
Resolution : 2.00 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

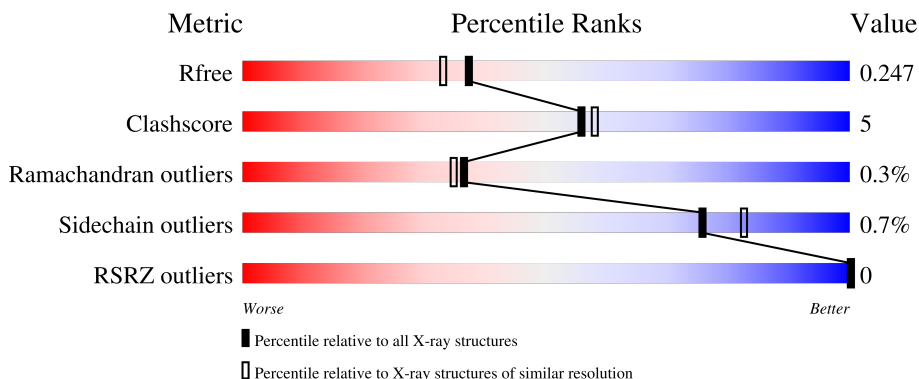
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	10052 (2.00-2.00)
Clashscore	190562	11152 (2.00-2.00)
Ramachandran outliers	187476	11031 (2.00-2.00)
Sidechain outliers	187428	11029 (2.00-2.00)
RSRZ outliers	180081	10067 (2.00-2.00)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	377	
1	B	377	
1	C	377	
1	D	377	

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 11041 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Anthranilate phosphoribosyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	346	Total	C	N	O	S	0	0	0
			2505	1566	465	465	9			
1	B	346	Total	C	N	O	S	0	0	0
			2505	1566	465	465	9			
1	C	346	Total	C	N	O	S	0	0	0
			2505	1566	465	465	9			
1	D	346	Total	C	N	O	S	0	0	0
			2505	1566	465	465	9			

There are 32 discrepancies between the modelled and reference sequences:

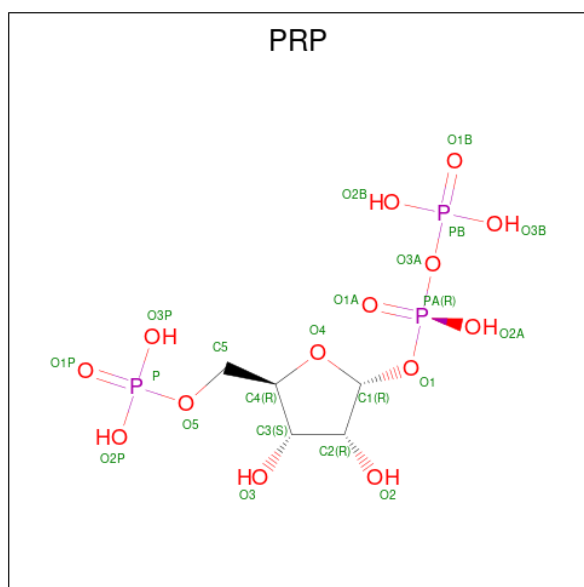
Chain	Residue	Modelled	Actual	Comment	Reference
A	371	LEU	-	expression tag	UNP P66992
A	372	GLU	-	expression tag	UNP P66992
A	373	HIS	-	expression tag	UNP P66992
A	374	HIS	-	expression tag	UNP P66992
A	375	HIS	-	expression tag	UNP P66992
A	376	HIS	-	expression tag	UNP P66992
A	377	HIS	-	expression tag	UNP P66992
A	378	HIS	-	expression tag	UNP P66992
B	371	LEU	-	expression tag	UNP P66992
B	372	GLU	-	expression tag	UNP P66992
B	373	HIS	-	expression tag	UNP P66992
B	374	HIS	-	expression tag	UNP P66992
B	375	HIS	-	expression tag	UNP P66992
B	376	HIS	-	expression tag	UNP P66992
B	377	HIS	-	expression tag	UNP P66992
B	378	HIS	-	expression tag	UNP P66992
C	371	LEU	-	expression tag	UNP P66992
C	372	GLU	-	expression tag	UNP P66992
C	373	HIS	-	expression tag	UNP P66992
C	374	HIS	-	expression tag	UNP P66992
C	375	HIS	-	expression tag	UNP P66992

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Chain	Residue	Modelled	Actual	Comment	Reference
C	376	HIS	-	expression tag	UNP P66992
C	377	HIS	-	expression tag	UNP P66992
C	378	HIS	-	expression tag	UNP P66992
D	371	LEU	-	expression tag	UNP P66992
D	372	GLU	-	expression tag	UNP P66992
D	373	HIS	-	expression tag	UNP P66992
D	374	HIS	-	expression tag	UNP P66992
D	375	HIS	-	expression tag	UNP P66992
D	376	HIS	-	expression tag	UNP P66992
D	377	HIS	-	expression tag	UNP P66992
D	378	HIS	-	expression tag	UNP P66992

- Molecule 2 is 1-O-pyrophosphono-5-O-phosphono-alpha-D-ribofuranose (CCD ID: PRP) (formula: $C_5H_{13}O_{14}P_3$).

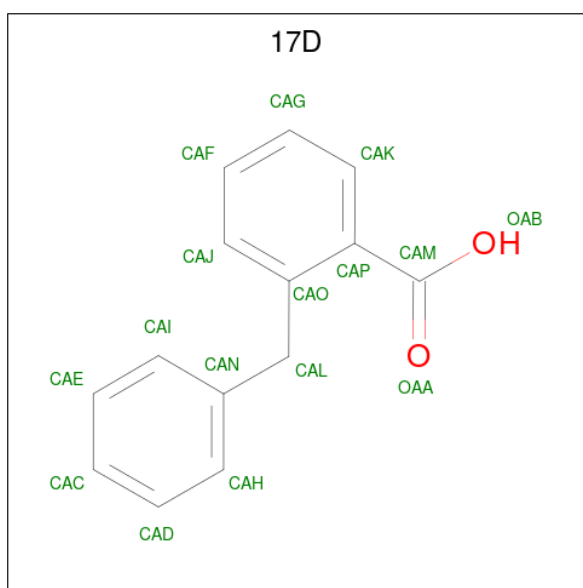


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total 22	C 5	O 14	P 3	0	0
2	B	1	Total 22	C 5	O 14	P 3	0	0
2	C	1	Total 22	C 5	O 14	P 3	0	0
2	D	1	Total 22	C 5	O 14	P 3	0	0

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	2	Total Mg 2 2	0	0
3	B	2	Total Mg 2 2	0	0
3	C	2	Total Mg 2 2	0	0
3	D	2	Total Mg 2 2	0	0

- Molecule 4 is 2-benzylbenzoic acid (CCD ID: 17D) (formula: C₁₄H₁₂O₂).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C O 16 14 2	0	0
4	A	1	Total C O 16 14 2	0	0
4	B	1	Total C O 16 14 2	0	0
4	C	1	Total C O 16 14 2	0	0
4	C	1	Total C O 16 14 2	0	0
4	D	1	Total C O 16 14 2	0	0

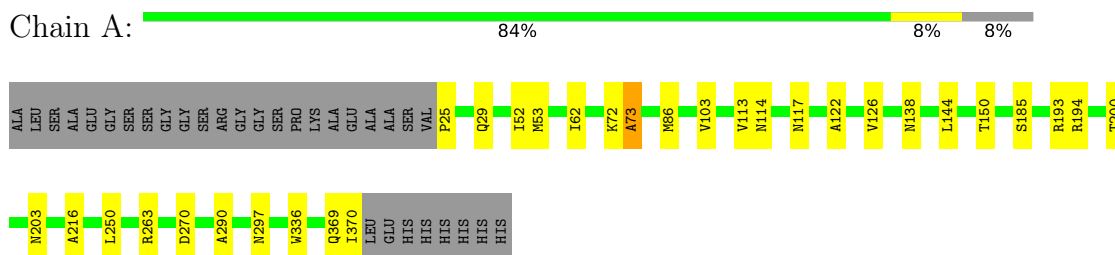
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	238	Total 238	O 238	0	0
5	B	209	Total 209	O 209	0	0
5	C	214	Total 214	O 214	0	0
5	D	168	Total 168	O 168	0	0

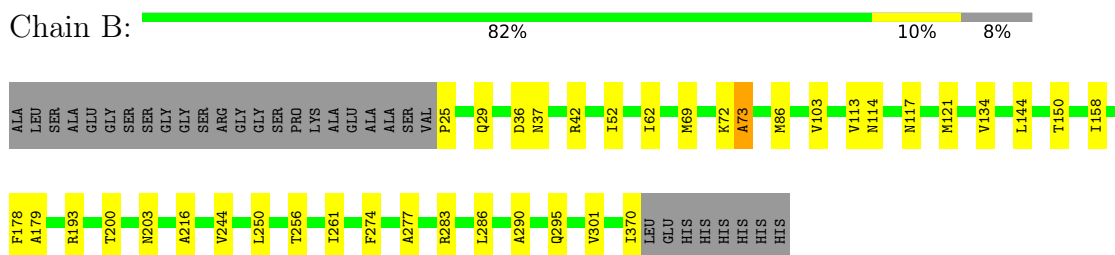
3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

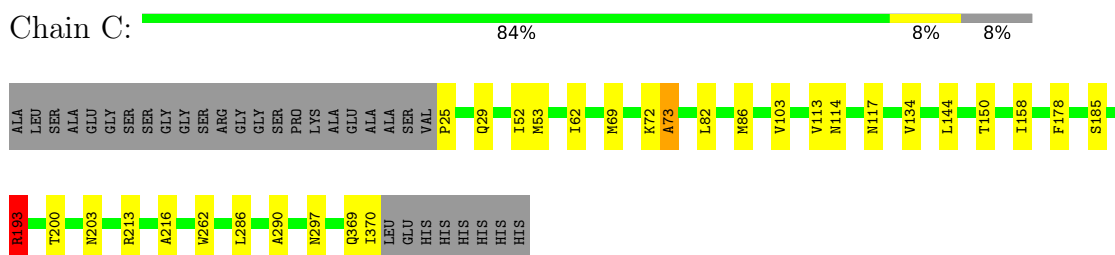
- Molecule 1: Anthranilate phosphoribosyltransferase



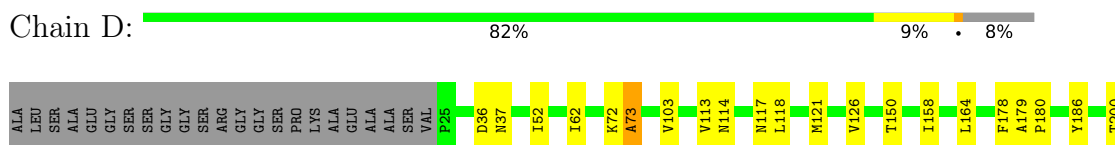
- Molecule 1: Anthranilate phosphoribosyltransferase



- Molecule 1: Anthranilate phosphoribosyltransferase



- Molecule 1: Anthranilate phosphoribosyltransferase



N203	A216	V244	T257	T258	I261	K271	F274	A290	V301	A323	H327	Q369	I370	LEU	GLU	HIS	HIS	HIS	HIS	HIS	HIS	HIS
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4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	78.39Å 80.82Å 110.52Å 90.00° 90.14° 90.00°	Depositor
Resolution (Å)	40.42 – 2.00 40.42 – 2.00	Depositor EDS
% Data completeness (in resolution range)	98.8 (40.42-2.00) 98.4 (40.42-2.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.16 (at 2.00Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.188 , 0.244 0.190 , 0.247	Depositor DCC
R_{free} test set	4581 reflections (4.93%)	wwPDB-VP
Wilson B-factor (Å ²)	24.3	Xtriage
Anisotropy	0.068	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 22.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.018 for -k,-h,-l 0.018 for k,h,-l 0.477 for h,-k,-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	11041	wwPDB-VP
Average B, all atoms (Å ²)	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 46.65 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.1112e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MG, PRP, 17D

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.92	0/2553	0.94	3/3483 (0.1%)
1	B	0.88	0/2553	0.95	2/3483 (0.1%)
1	C	0.96	3/2553 (0.1%)	0.98	2/3483 (0.1%)
1	D	0.90	0/2553	0.95	4/3483 (0.1%)
All	All	0.92	3/10212 (0.0%)	0.96	11/13932 (0.1%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	193	ARG	C-O	-6.51	1.16	1.24
1	C	193	ARG	CZ-NH2	-5.25	1.26	1.33
1	C	213	ARG	C-O	-5.25	1.21	1.23

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	369	GLN	N-CA-C	9.38	122.91	112.97
1	A	113	VAL	CA-C-N	-7.06	112.32	122.77
1	A	113	VAL	C-N-CA	-7.06	112.32	122.77
1	C	113	VAL	CA-C-N	-6.44	113.24	122.77
1	C	113	VAL	C-N-CA	-6.44	113.24	122.77
1	D	113	VAL	CA-C-N	-6.22	114.21	122.85
1	D	113	VAL	C-N-CA	-6.22	114.21	122.85
1	B	113	VAL	CA-C-N	-5.42	115.32	122.85
1	B	113	VAL	C-N-CA	-5.42	115.32	122.85
1	A	336	TRP	N-CA-C	5.34	116.79	110.97
1	D	118	LEU	N-CA-C	5.01	116.74	111.28

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2505	0	2500	20	0
1	B	2505	0	2500	27	0
1	C	2505	0	2500	24	0
1	D	2505	0	2500	23	0
2	A	22	0	8	0	0
2	B	22	0	8	0	0
2	C	22	0	8	0	0
2	D	22	0	8	0	0
3	A	2	0	0	0	0
3	B	2	0	0	0	0
3	C	2	0	0	0	0
3	D	2	0	0	0	0
4	A	32	0	22	5	0
4	B	16	0	11	4	0
4	C	32	0	22	3	0
4	D	16	0	11	1	0
5	A	238	0	0	2	0
5	B	209	0	0	5	0
5	C	214	0	0	2	0
5	D	168	0	0	3	0
All	All	11041	0	10098	96	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 5.

All (96) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:369:GLN:O	1:D:370:ILE:HG13	1.69	0.93
1:B:42:ARG:HD3	5:B:776:HOH:O	1.76	0.85
1:A:114:ASN:HD21	1:A:144:LEU:HD12	1.46	0.78
1:D:117:ASN:ND2	1:D:150:THR:OG1	2.20	0.74
1:D:36:ASP:HB3	5:D:396:HOH:O	1.86	0.73
1:B:42:ARG:CD	5:B:776:HOH:O	2.36	0.73
1:B:86:MET:HE1	4:B:602:17D:HAG	1.69	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:369:GLN:O	1:C:370:ILE:HB	1.91	0.71
1:B:117:ASN:ND2	1:B:150:THR:OG1	2.25	0.69
1:A:117:ASN:ND2	1:A:150:THR:OG1	2.29	0.66
1:B:295:GLN:HG2	5:B:413:HOH:O	1.95	0.66
1:C:117:ASN:ND2	1:C:150:THR:OG1	2.28	0.66
1:A:52:ILE:HG12	1:A:62:ILE:HG12	1.78	0.65
1:D:114:ASN:O	1:D:290:ALA:HA	1.99	0.62
1:D:200:THR:H	1:D:203:ASN:ND2	1.97	0.62
1:B:103:VAL:HG12	1:B:216:ALA:HB3	1.82	0.62
1:B:36:ASP:HB3	5:B:633:HOH:O	2.01	0.60
1:B:86:MET:HE1	4:B:602:17D:CAG	2.31	0.60
4:A:600:17D:HALA	4:A:600:17D:OAB	2.02	0.60
1:D:52:ILE:HG12	1:D:62:ILE:HG12	1.85	0.59
1:C:52:ILE:HG12	1:C:62:ILE:HG12	1.86	0.58
1:A:194:ARG:HB3	5:A:391:HOH:O	2.04	0.57
1:D:103:VAL:HG12	1:D:216:ALA:HB3	1.87	0.57
1:B:179:ALA:HB1	4:B:602:17D:HAJ	1.87	0.56
1:D:244:VAL:HG12	1:D:261:ILE:HG12	1.87	0.56
1:B:52:ILE:HG12	1:B:62:ILE:HG12	1.87	0.56
1:D:179:ALA:HB3	1:D:180:PRO:HD3	1.86	0.56
1:B:25:PRO:HA	1:B:29:GLN:OE1	2.05	0.56
1:B:200:THR:H	1:B:203:ASN:ND2	2.03	0.56
1:A:369:GLN:O	1:A:370:ILE:HB	2.06	0.55
1:C:103:VAL:HG12	1:C:216:ALA:HB3	1.89	0.55
1:C:262:TRP:NE1	5:C:724:HOH:O	2.32	0.55
1:C:193:ARG:HG2	5:C:496:HOH:O	2.07	0.55
1:B:121:MET:HG2	1:B:301:VAL:HG22	1.90	0.53
1:B:114:ASN:O	1:B:290:ALA:HA	2.09	0.53
1:B:114:ASN:HD21	1:B:144:LEU:HB2	1.73	0.53
1:C:86:MET:HE1	4:C:602:17D:HAG	1.91	0.53
1:C:114:ASN:HD21	1:C:144:LEU:HD12	1.76	0.51
1:A:200:THR:H	1:A:203:ASN:ND2	2.09	0.51
1:B:121:MET:CG	1:B:301:VAL:HG22	2.41	0.50
1:D:121:MET:HG2	1:D:301:VAL:HG22	1.93	0.50
1:A:114:ASN:O	1:A:290:ALA:HA	2.12	0.50
1:D:121:MET:CG	1:D:301:VAL:HG22	2.42	0.50
1:A:117:ASN:HD21	1:A:297:ASN:HD22	1.59	0.49
1:D:36:ASP:CB	5:D:396:HOH:O	2.53	0.49
1:D:103:VAL:HG11	1:D:327:HIS:HB2	1.94	0.49
1:A:53:MET:O	1:A:185:SER:HB3	2.13	0.48
1:D:164:LEU:HD12	5:D:503:HOH:O	2.12	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:86:MET:HE1	4:C:602:17D:CAG	2.43	0.48
1:B:86:MET:CE	4:B:602:17D:HAG	2.40	0.48
4:C:600:17D:HALA	4:C:600:17D:OAB	2.14	0.47
1:B:244:VAL:HG12	1:B:261:ILE:HG12	1.97	0.47
1:D:186:TYR:CZ	4:D:602:17D:HAK	2.49	0.47
1:C:72:LYS:O	1:C:73:ALA:HB3	2.15	0.47
1:D:261:ILE:HD12	1:D:274:PHE:HB2	1.97	0.46
1:C:72:LYS:O	1:C:73:ALA:CB	2.63	0.46
1:B:261:ILE:HD12	1:B:274:PHE:HB2	1.96	0.46
1:C:200:THR:H	1:C:203:ASN:ND2	2.13	0.46
1:C:25:PRO:HA	1:C:29:GLN:OE1	2.16	0.46
1:A:193:ARG:HG3	5:A:543:HOH:O	2.15	0.45
1:C:117:ASN:HD21	1:C:297:ASN:HD22	1.64	0.45
1:C:72:LYS:HD2	1:C:72:LYS:C	2.41	0.45
1:B:193:ARG:HG3	5:B:483:HOH:O	2.16	0.45
1:A:103:VAL:HG12	1:A:216:ALA:HB3	1.98	0.45
1:C:114:ASN:HD21	1:C:144:LEU:CD1	2.30	0.45
1:C:286:LEU:HD12	1:C:286:LEU:HA	1.87	0.44
1:A:72:LYS:O	1:A:73:ALA:CB	2.66	0.43
1:B:72:LYS:O	1:B:73:ALA:CB	2.65	0.43
1:C:134:VAL:HG13	1:C:134:VAL:O	2.18	0.43
1:D:72:LYS:O	1:D:73:ALA:CB	2.66	0.43
1:A:86:MET:HE1	4:A:602:17D:HAG	2.00	0.43
1:C:69:MET:HE2	1:C:82:LEU:HD11	2.01	0.43
1:A:117:ASN:ND2	1:A:297:ASN:HD22	2.17	0.43
1:D:200:THR:H	1:D:203:ASN:HD22	1.65	0.42
1:A:25:PRO:HA	1:A:29:GLN:OE1	2.19	0.42
1:C:117:ASN:ND2	1:C:297:ASN:HD22	2.18	0.42
1:C:369:GLN:O	1:C:370:ILE:CB	2.65	0.42
1:D:126:VAL:HG21	1:D:323:ALA:HB3	2.00	0.42
1:D:72:LYS:O	1:D:73:ALA:HB3	2.20	0.42
1:B:256:THR:HG21	1:B:286:LEU:HD13	2.02	0.42
1:D:257:THR:OG1	1:D:258:THR:N	2.53	0.42
1:A:263:ARG:HH21	1:A:270:ASP:CG	2.28	0.41
1:C:158:ILE:O	1:C:178:PHE:HB2	2.20	0.41
1:B:42:ARG:NH1	1:B:42:ARG:HB2	2.34	0.41
1:D:158:ILE:O	1:D:178:PHE:HB2	2.21	0.41
1:A:138:ASN:HD21	4:A:600:17D:CAN	2.33	0.41
1:B:277:ALA:HB2	1:B:283:ARG:NH1	2.35	0.41
1:A:138:ASN:HD21	4:A:600:17D:CAH	2.33	0.41
1:C:53:MET:O	1:C:185:SER:HB3	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:114:ASN:O	1:C:290:ALA:HA	2.21	0.41
1:A:193:ARG:HD3	4:A:600:17D:HAE	2.03	0.41
1:B:69:MET:HB2	1:B:69:MET:HE3	1.85	0.41
1:A:122:ALA:O	1:A:126:VAL:HG23	2.21	0.40
1:D:72:LYS:HE3	1:D:72:LYS:HB3	1.90	0.40
1:B:158:ILE:O	1:B:178:PHE:HB2	2.21	0.40
1:B:134:VAL:O	1:B:134:VAL:HG13	2.22	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	344/377 (91%)	337 (98%)	6 (2%)	1 (0%)	36	35
1	B	344/377 (91%)	333 (97%)	10 (3%)	1 (0%)	36	35
1	C	344/377 (91%)	340 (99%)	3 (1%)	1 (0%)	36	35
1	D	344/377 (91%)	335 (97%)	8 (2%)	1 (0%)	36	35
All	All	1376/1508 (91%)	1345 (98%)	27 (2%)	4 (0%)	36	35

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	73	ALA
1	B	73	ALA
1	C	73	ALA
1	D	73	ALA

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	243/264 (92%)	242 (100%)	1 (0%)	84	89
1	B	243/264 (92%)	240 (99%)	3 (1%)	63	70
1	C	243/264 (92%)	242 (100%)	1 (0%)	84	89
1	D	243/264 (92%)	241 (99%)	2 (1%)	73	80
All	All	972/1056 (92%)	965 (99%)	7 (1%)	76	82

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	250	LEU
1	B	37	ASN
1	B	250	LEU
1	B	370	ILE
1	C	193	ARG
1	D	37	ASN
1	D	271	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (19) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	114	ASN
1	A	117	ASN
1	A	188	HIS
1	A	203	ASN
1	A	285	GLN
1	B	37	ASN
1	B	56	ASN
1	B	117	ASN
1	B	203	ASN
1	B	358	GLN
1	C	114	ASN
1	C	117	ASN

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Mol	Chain	Res	Type
1	C	138	ASN
1	C	188	HIS
1	C	203	ASN
1	C	358	GLN
1	D	56	ASN
1	D	117	ASN
1	D	203	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 18 ligands modelled in this entry, 8 are monoatomic - leaving 10 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
4	17D	A	602	-	17,17,17	1.21	1 (5%)	22,22,22	1.62	4 (18%)
2	PRP	C	400	3	20,22,22	1.76	4 (20%)	32,35,35	1.16	4 (12%)
4	17D	C	602	-	17,17,17	1.32	1 (5%)	22,22,22	1.45	2 (9%)
4	17D	D	602	-	17,17,17	1.33	1 (5%)	22,22,22	1.24	2 (9%)
2	PRP	A	400	3	20,22,22	1.71	4 (20%)	32,35,35	1.15	3 (9%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	17D	C	600	-	17,17,17	0.99	1 (5%)	22,22,22	1.18	1 (4%)
4	17D	A	600	-	17,17,17	1.05	1 (5%)	22,22,22	1.12	1 (4%)
4	17D	B	602	-	17,17,17	1.21	1 (5%)	22,22,22	1.76	7 (31%)
2	PRP	B	400	3	20,22,22	1.57	3 (15%)	32,35,35	1.24	4 (12%)
2	PRP	D	400	3	20,22,22	1.34	2 (10%)	32,35,35	1.36	5 (15%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	17D	A	602	-	-	2/8/8/8	0/2/2/2
2	PRP	C	400	3	-	1/16/33/33	0/1/1/1
4	17D	C	602	-	-	2/8/8/8	0/2/2/2
4	17D	D	602	-	-	1/8/8/8	0/2/2/2
2	PRP	A	400	3	-	1/16/33/33	0/1/1/1
4	17D	C	600	-	-	2/8/8/8	0/2/2/2
4	17D	A	600	-	-	2/8/8/8	0/2/2/2
4	17D	B	602	-	-	4/8/8/8	0/2/2/2
2	PRP	B	400	3	-	6/16/33/33	0/1/1/1
2	PRP	D	400	3	-	2/16/33/33	0/1/1/1

All (19) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	400	PRP	P-O1P	4.08	1.63	1.50
2	C	400	PRP	P-O1P	4.03	1.63	1.50
4	C	602	17D	CAP-CAM	3.56	1.57	1.49
2	A	400	PRP	PB-O2B	3.56	1.68	1.54
2	C	400	PRP	PB-O2B	3.44	1.67	1.54
2	A	400	PRP	P-O1P	3.42	1.61	1.50
4	D	602	17D	CAP-CAM	3.30	1.56	1.49
2	A	400	PRP	PA-O1A	3.16	1.61	1.50
2	C	400	PRP	O4-C4	3.12	1.51	1.45
4	A	602	17D	CAP-CAM	3.00	1.56	1.49
2	B	400	PRP	PB-O1B	2.80	1.59	1.50
2	D	400	PRP	P-O1P	2.80	1.59	1.50
2	B	400	PRP	P-O2P	2.80	1.65	1.54

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	400	PRP	PB-O1B	2.69	1.58	1.50
2	A	400	PRP	PB-O1B	2.55	1.58	1.50
4	A	600	17D	CAP-CAM	2.40	1.54	1.49
4	C	600	17D	CAP-CAM	2.40	1.54	1.49
4	B	602	17D	CAP-CAM	2.27	1.54	1.49
2	C	400	PRP	PA-O1A	2.09	1.58	1.50

All (33) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	602	17D	CAL-CAO-CAJ	-4.46	113.25	120.46
4	B	602	17D	CAL-CAO-CAJ	-4.17	113.71	120.46
4	C	602	17D	CAL-CAO-CAJ	-4.04	113.92	120.46
4	B	602	17D	OAA-CAM-CAP	-3.84	112.80	121.97
4	D	602	17D	CAL-CAO-CAJ	-3.54	114.73	120.46
4	D	602	17D	CAO-CAL-CAN	-3.29	106.96	114.21
2	D	400	PRP	O2A-PA-O3A	2.98	115.32	107.27
4	B	602	17D	CAO-CAL-CAN	-2.97	107.67	114.21
4	A	602	17D	CAO-CAL-CAN	-2.93	107.75	114.21
2	D	400	PRP	O1-C1-C2	-2.89	101.96	106.65
4	C	600	17D	OAA-CAM-CAP	-2.73	115.44	121.97
2	A	400	PRP	PA-O1-C1	2.71	132.24	121.21
4	C	602	17D	CAO-CAL-CAN	-2.70	108.27	114.21
4	B	602	17D	CAO-CAP-CAM	2.62	126.53	122.47
4	A	600	17D	OAA-CAM-CAP	-2.60	115.75	121.97
2	D	400	PRP	C5-C4-C3	-2.57	105.96	115.21
2	C	400	PRP	PA-O1-C1	2.50	131.38	121.21
2	C	400	PRP	O3B-PB-O3A	2.38	112.63	104.64
2	D	400	PRP	O3B-PB-O2B	2.35	116.61	107.80
4	B	602	17D	OAB-CAM-CAP	2.30	121.82	115.28
4	B	602	17D	CAK-CAP-CAM	-2.29	113.37	118.64
2	B	400	PRP	O1-C1-C2	-2.29	102.94	106.65
2	B	400	PRP	O3A-PB-O1B	-2.25	99.19	111.04
2	B	400	PRP	O3P-P-O5	2.24	112.51	106.67
2	C	400	PRP	O3B-PB-O2B	2.23	116.18	107.80
4	A	602	17D	CAI-CAN-CAH	2.17	121.45	118.23
2	B	400	PRP	O3B-PB-O2B	2.11	115.73	107.80
2	A	400	PRP	O2B-PB-O3A	2.09	111.64	104.64
4	B	602	17D	CAL-CAO-CAP	2.09	128.39	123.79
4	A	602	17D	OAA-CAM-CAP	-2.06	117.06	121.97
2	D	400	PRP	O3A-PB-O1B	-2.03	100.38	111.04
2	C	400	PRP	O3A-PB-O1B	-2.02	100.39	111.04

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	400	PRP	O3P-P-O5	2.01	111.91	106.67

There are no chirality outliers.

All (23) torsion outliers are listed below:

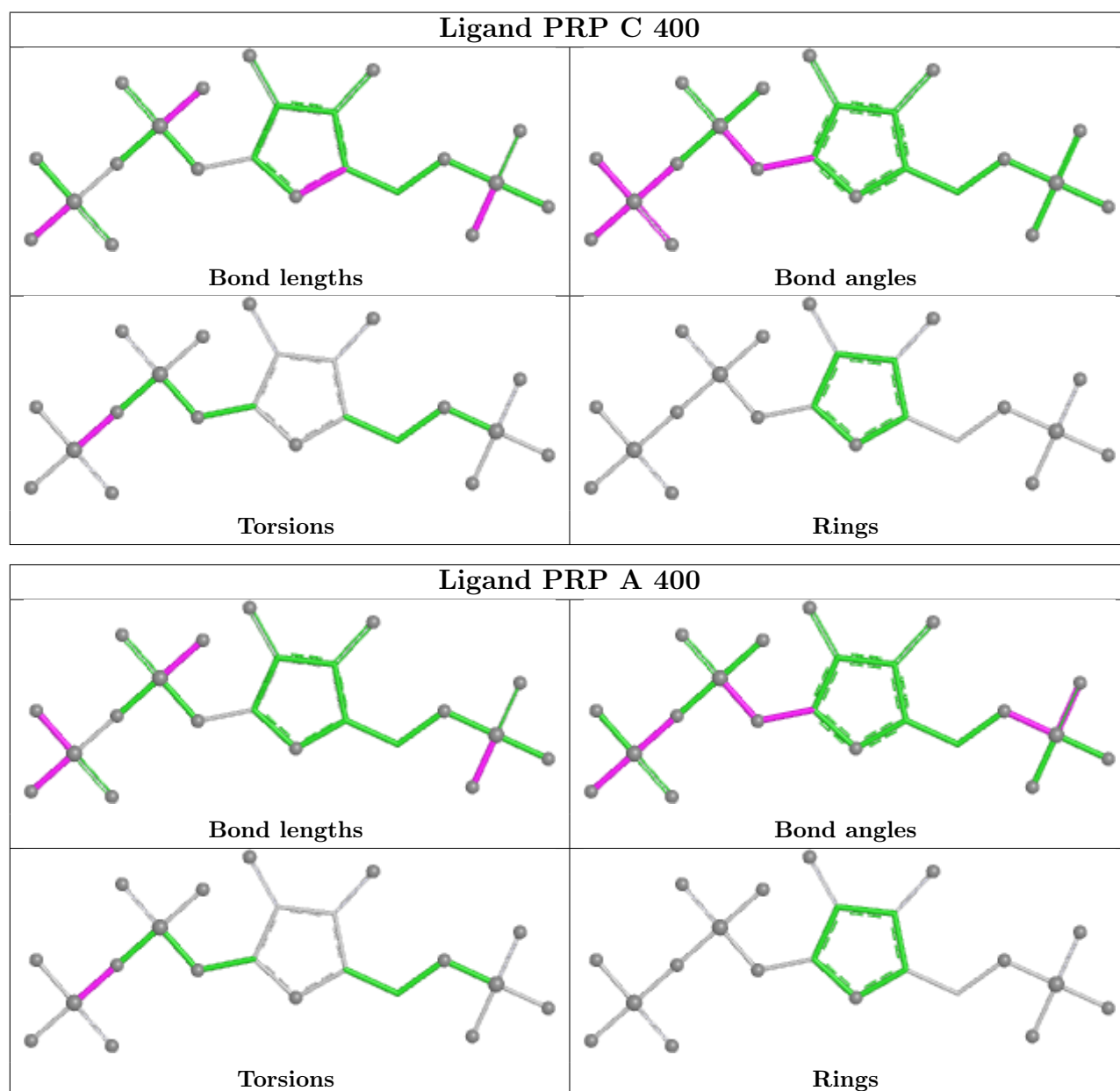
Mol	Chain	Res	Type	Atoms
2	B	400	PRP	C5-O5-P-O1P
2	B	400	PRP	PA-O3A-PB-O1B
2	D	400	PRP	PA-O3A-PB-O1B
2	B	400	PRP	O4-C4-C5-O5
2	B	400	PRP	C3-C4-C5-O5
4	B	602	17D	OAB-CAM-CAP-CAK
4	B	602	17D	OAA-CAM-CAP-CAK
4	B	602	17D	OAB-CAM-CAP-CAO
2	A	400	PRP	PA-O3A-PB-O1B
2	C	400	PRP	PA-O3A-PB-O1B
4	B	602	17D	OAA-CAM-CAP-CAO
4	C	600	17D	CAO-CAL-CAN-CAH
4	C	600	17D	CAO-CAL-CAN-CAI
4	A	600	17D	CAO-CAL-CAN-CAI
4	A	600	17D	CAO-CAL-CAN-CAH
4	D	602	17D	OAB-CAM-CAP-CAK
2	B	400	PRP	C5-O5-P-O2P
4	C	602	17D	OAB-CAM-CAP-CAK
4	A	602	17D	OAA-CAM-CAP-CAK
4	C	602	17D	OAA-CAM-CAP-CAK
4	A	602	17D	OAB-CAM-CAP-CAK
2	B	400	PRP	C2-C1-O1-PA
2	D	400	PRP	C2-C1-O1-PA

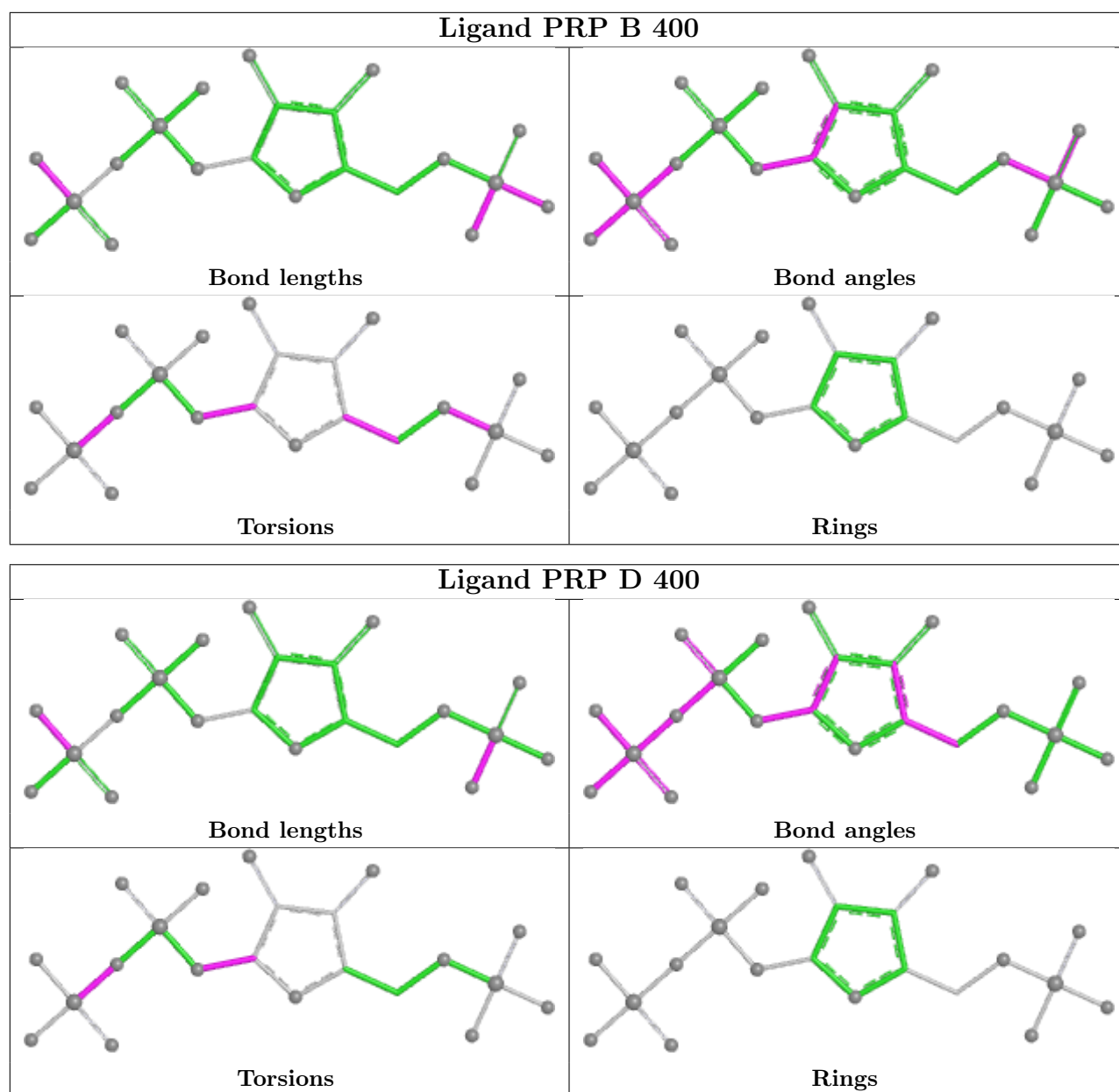
There are no ring outliers.

6 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	602	17D	1	0
4	C	602	17D	2	0
4	D	602	17D	1	0
4	C	600	17D	1	0
4	A	600	17D	4	0
4	B	602	17D	4	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	346/377 (91%)	-1.47	0 100 100	14, 21, 32, 53	0
1	B	346/377 (91%)	-1.38	0 100 100	15, 25, 41, 61	0
1	C	346/377 (91%)	-1.46	0 100 100	13, 21, 32, 53	0
1	D	346/377 (91%)	-1.38	0 100 100	14, 25, 40, 58	0
All	All	1384/1508 (91%)	-1.42	0 100 100	13, 23, 39, 61	0

There are no RSRZ outliers to report.

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

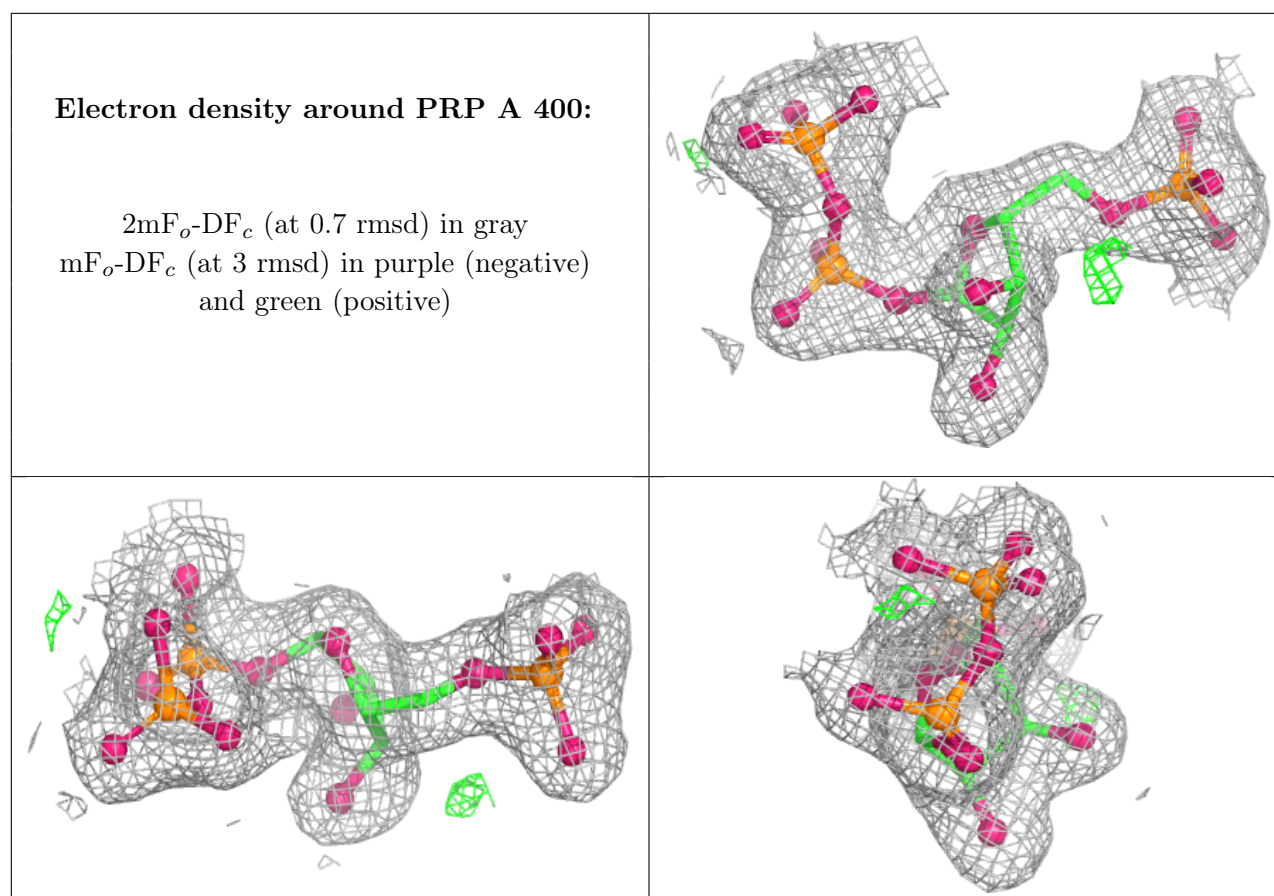
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	17D	C	600	16/16	0.98	0.05	38,41,44,44	0
3	MG	B	500	1/1	0.99	0.01	21,21,21,21	0
3	MG	B	501	1/1	0.99	0.03	38,38,38,38	0
3	MG	C	501	1/1	0.99	0.04	31,31,31,31	0

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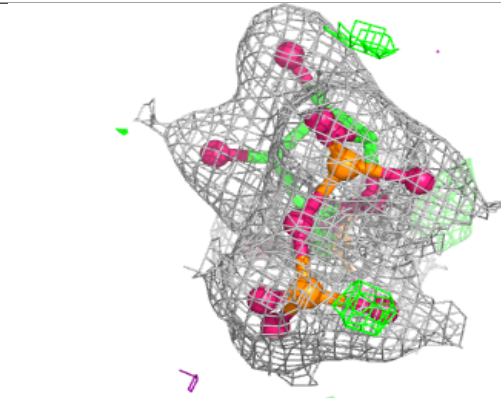
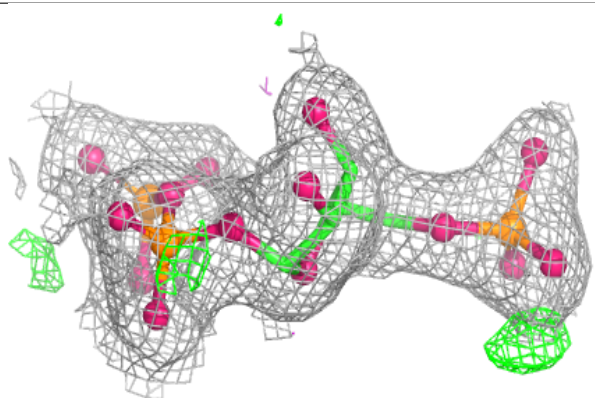
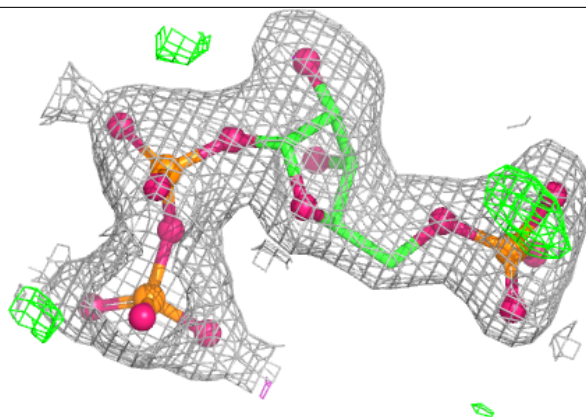
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	17D	A	600	16/16	0.99	0.04	34,38,43,43	0
4	17D	A	602	16/16	0.99	0.04	21,27,31,35	0
4	17D	B	602	16/16	0.99	0.04	24,33,41,44	0
4	17D	C	602	16/16	0.99	0.04	20,25,32,35	0
3	MG	A	501	1/1	0.99	0.03	34,34,34,34	0
4	17D	D	602	16/16	0.99	0.04	23,29,38,43	0
3	MG	D	500	1/1	1.00	0.01	21,21,21,21	0
3	MG	D	501	1/1	1.00	0.02	39,39,39,39	0
3	MG	A	500	1/1	1.00	0.01	16,16,16,16	0
2	PRP	A	400	22/22	1.00	0.02	14,20,23,23	0
2	PRP	B	400	22/22	1.00	0.02	17,28,32,33	0
2	PRP	C	400	22/22	1.00	0.02	15,20,22,23	0
3	MG	C	500	1/1	1.00	0.01	17,17,17,17	0
2	PRP	D	400	22/22	1.00	0.02	16,26,31,33	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

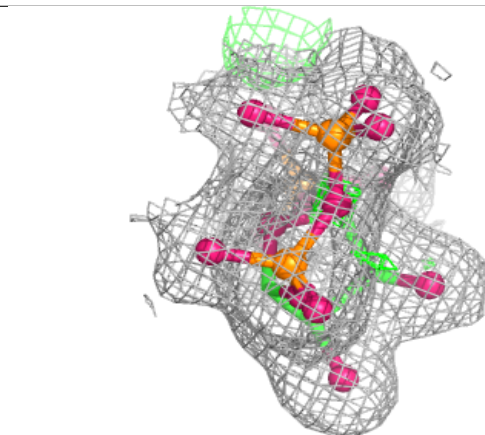
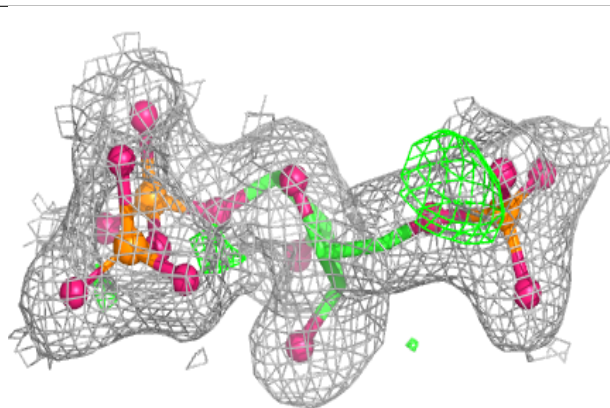
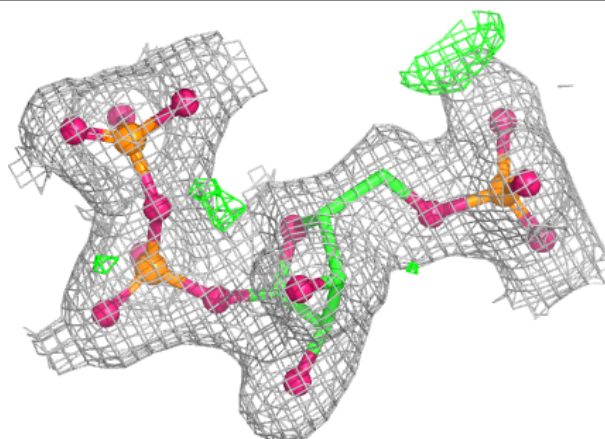


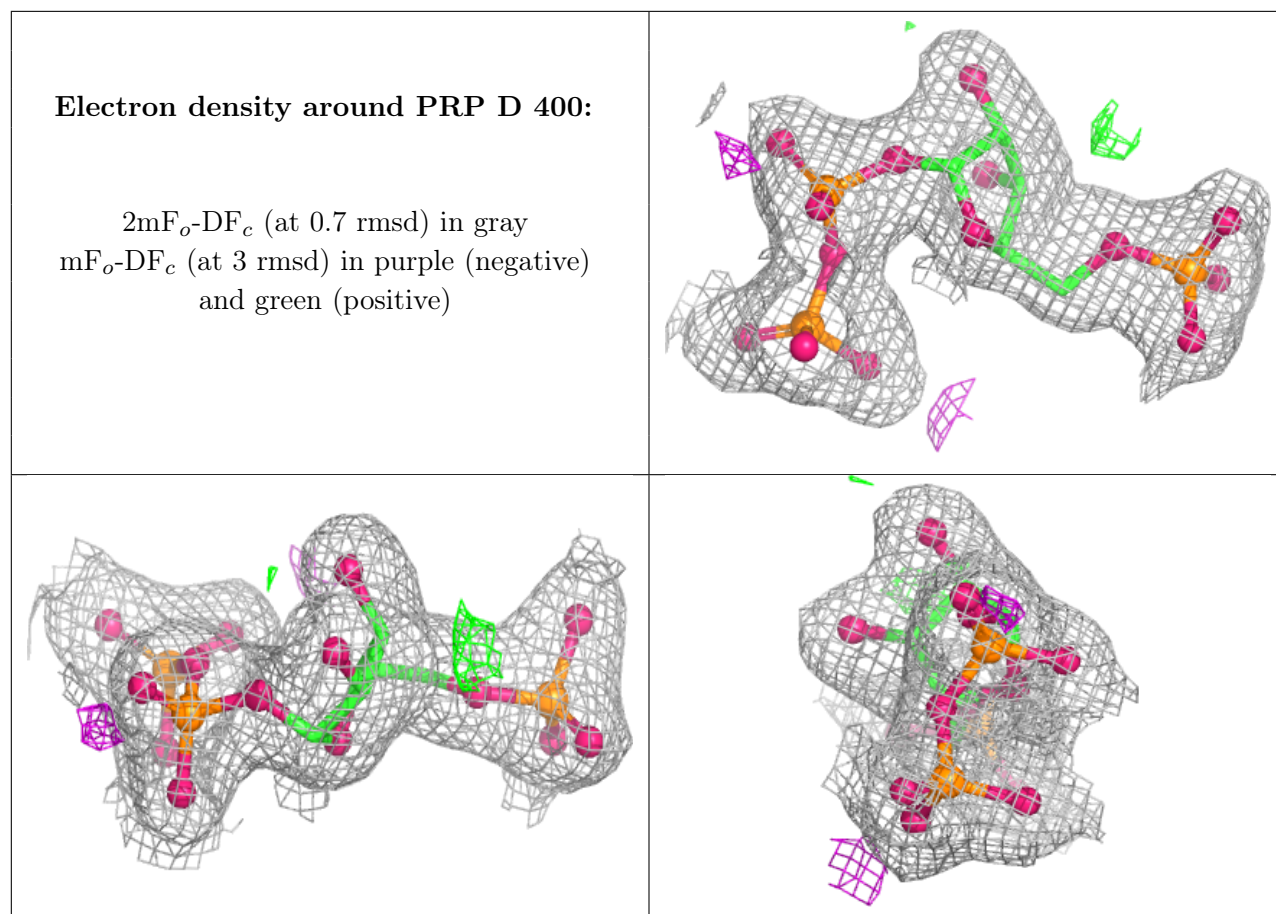
Electron density around PRP B 400:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

**Electron density around PRP C 400:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





6.5 Other polymers [i](#)

There are no such residues in this entry.